SMALL NAVIGATION PROJECT

COHASSET HARBOR

COHASSET
MASSACHUSETTS

DETAILED PROJECT REPORT

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS WALTHAM, MASS.

FEBRUARY 1965

FINAL 12 OCT 65

NEDED-R (19 Feb 65) 2d Ind
SUBJECT: Detailed Project Report for Small Navigation Project, Cohasset Harbor, Cohasset, Massachusetts

U. S. Army Engineer Div., New England, Waltham, Mass. 18 October 1965

TO: Chief of Engineers, ATTN: ENGCW-PD

1. Consideration of comment in paragraph 2 of the 1st indorsement indicates the following conclusion. The problem at Cohasset Harbor is overcrowding due to insufficient anchorage facilities. The existing fleet is crowded into the existing project and into the adjacent shallow coves where they ground out. The project as proposed provides for dredging areas presently used by the existing fleet. Dredging these areas, Cohasset Cove, Government Island Area and Bailey Creek, is the more practical and economical method of providing mooring space. The study indicated that available areas for economical improvement are limited and would provide for only a small expansion of the existing fleet. Based on the expanding recreational fleets along the coast, it is strongly anticipated that greater demands for facilities would be made. In this case, it is considered that, in view of the presence of rock or hard materials in the remaining areas available for improvement and the high attendant cost, future demand for facilities at Cohasset would be more economically satisfied by marina type facilities. As shown in paragraph 50, page 21, benefits from the recommended improvement would accrue predominantly to the existing fleet. With respect to provision of marina facilities in lieu of open anchorage, it is considered that such facilities could not be economically provided unless access from the harbor is provided. The project as recommended will provide the needed access and thereby encourage development of marinas.

2. The Governor of Massachusetts has been informed of the proposed project and his comments endorsing the project are included as part of the report. In accordance with EM 1165-2-14, paragraph 14(5), there are inclosed 10 copies of the final report.

3. Members of Congress were notified of formal adoption of the project by letters dated 12 October 1965. In accordance with

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paragraph 4 of the preceding indorsement, the date of final project approval for record purposes is 12 October 1965. The Governor of Massachusetts, interested State agencies and the Selectmen of the Town of Cohasset were notified of project approval on 15 October 1965.

1 Incl
wd incl 1
Added 1 incl
2. Revised DPR,
Cohasset Hbr, Mass.
(10 cys)

E. J. RIBBS
Colonel, Corps of Engineers
Acting Division Engineer

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
WALTHAM, MASS. 02154

ADDRESS REPLY TO:
DIVISION ENGINEER

REFER TO FILE NO. NEDED-R

19 February 1965

SUBJECT: Detailed Project Report for Small Navigation Project, Cohasset Harbor, Cohasset, Massachusetts

TO: Chief of Engineers
Department of the Army
ATTN: ENGCW-PD
Washington, D. C.

1. In accordance with EM 1165-2-107, there is submitted for review and comment an advance draft of the subject report.

2. Responsible officials of the State of Massachusetts and Town of Cohasset concur in the recommended project and have given firm indications that the requirements of local cooperation would be met. Formal assurances of participation will be obtained from the State and Town during preparation of final design for the project.

3. The plans and specifications will be prepared in accordance with the Detailed Project Report as approved. Funds in the amount of $7,000 for preparation of the plans and specifications and $94,000 for the Federal share of construction will be required. The local share will be $97,000 or 44% of the estimated project cost.

4. Formal comments of the Governor of Massachusetts will be requested after approval of the advance draft.

Incl (10 cys)
as

E. J. RIBBS
Colonel, Corps of Engineers
Acting Division Engineer

ENGCW-PD (19 Feb 65) 1st Ind
SUBJECT: Detailed Project Report for Small Navigation Project, Cohasset Harbor, Cohasset, Massachusetts

HQ, DA, CofEngrs, Washington, D. C. 20315, 20 April 1965

TO: Division Engineer, U. S. Army Engineer Division, New England
WALTHAM, MASSACHUSETTS 02154

1. The report will be acceptable subject to the comments in the following paragraphs.

2. It is noted that it is concluded that, after provision of the proposed anchorages, future facilities for the expanding recreational fleet can be expected to be obtained more economically through construction of marina-type facilities (paragraph 63). Report paragraph 47 indicates that the anticipated future additions to the fleet are expected to be realized within one year after completion of the recommended plan. As pointed out in paragraph 8 of EM 1120-3-113, future needs should be visualized and open anchorage areas should not be proposed where marina-type facilities will be needed to serve prospective traffic. It is understood that this aspect was considered during project formulation for this project. The report should be expanded to show consideration given to marina-type facilities and the basis for selection of the open anchorage features as recommended.

3. Future reports should show the draft requirements of the existing and prospective vessels.

4. Subject to these comments the Governor of Massachusetts should be informed of the project proposal and formal State endorsement obtained. After receipt of favorable State comments fully endorsing the proposal, the recommended navigation project for Cohasset Harbor may be considered formally approved under Section 107 of the 1960 River and Harbor Act. Authority is then granted to issue simultaneous notification to the concerned Members of Congress and State Governor informing them of the formal project approval and adoption under Section 107. The date of notification will be considered the date of final project approval for record purposes. The Cohasset Harbor project will then take its place on the backlog of approved Section 107 projects. Financing of project construction will be dependent upon future appropriations.

5. Subject to the foregoing, authority is granted to commence preconstruction work, including preparation of plans and specifications. The following work allowance is established to cover preconstruction work pursuant to the small navigation project authority provided by Section 107 of the 1960 River and Harbor Act:

Location	Code 902-	Amount
Cohasset Harbor, Massachusetts	216	$8,000

ENGCW-PD (19 Feb 65) 1st Ind 20 April 1965
SUBJECT: Detailed Project Report for Small Navigation Project, Cohasset Harbor, Cohasset, Massachusetts

6. Allotment of $8,000 under appropriation 96X3122 Construction, General will be sent by separate communication.

FOR THE CHIEF OF ENGINEERS:

for JACKSON GRAHAM
Major General, USA
Director of Civil Works

Incl
3 cys w/d

U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
424 TRAPELO ROAD
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19 February 1965

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COHASSET HARBOR, MASSACHUSETTS

PERTINENT DATA

1. Purpose: Expansion of existing anchorage facilities in Cohasset Harbor, Massachusetts to reduce crowding of moored craft, reduce delays and permit increased harbor use.

2. Location: Cohasset Harbor is located in the Towns of Cohasset and Scituate, about 16 miles southeast of Boston, Massachusetts.

3. Existing Project: The existing Federal project for Cohasset Harbor, adopted by the River and Harbor Act of 2 March 1945, provides for an entrance channel 8 feet deep, 90 feet wide from the outer harbor to anchorage area of 18 acres, 7 feet deep in the inner harbor. The anchorage area is protected by a breakwater constructed by the Commonwealth of Massachusetts. The existing project was completed in 1960.

4. Improvement Desired: Expansion of existing harbor anchorage facilities to greatest extent possible to relieve congestion. Local interests desire improvement of Cohasset Cove to accommodate fishing and recreational craft, and improvement of the so-called "Government Island" area and Bailey Creek to provide for anchorage space for recreational craft.

5. Recommended Improvement: Four plans of improvement were considered to provide for existing and prospective use of the harbor by fishing and recreational craft. In view of the presence of ledge areas in the harbor, the cost of three of the plans were not commensurate with the benefits to justify Federal improvement. A plan to provide 12.6 acres of anchorage space, 6 feet deep, was found to provide for the existing fleet and permit some expansion of the existing fleet. Facilities required for expansion of the fleet beyond that provided by the recommended project would require local interests to give consideration to marina type facilities. Recommendation is made to modify the existing project to provide 12.6 acres of anchorage area, 6 feet deep as follows:

a. 3.9 acres in Cohasset Cove
b. 3.3 acres vicinity of Government Island area
c. 5.4 acres in Bailey Creek

6. Estimated Costs:

Dredging 12.6 acres of anchorage 6 ft. deep; 75,000 c.y.	$152,000
Contingencies @ 15%	23,000
Engineering and Design	30,000*
Supervision and Administration	15,000
Construction Total (Jan. 1965)	$220,000

*Includes cost of Detailed Project Study

7. Apportionment of First Cost:

Federal:	
Corps of Engineers: 56% of $220,000	$123,000
Coast Guard: Additional Navigation Aids	0
TOTAL Federal	$123,000
Non-Federal:	
Cash Contribution: 44% of $220,000	97,000
Public Landings (self-liquidating)	0
TOTAL Non-Federal	$ 97,000

8. Annual Costs:

Federal and Non-Federal:	
Interest and Amortization (50 yrs @ 3-1/8%) ($220,000 x .03979)	8,750
Maintenance: Anchorages	5,000
Navigation Aids	0
	$ 13,750

9. Benefits:	General	Local	Total
Fishing Boats			
Reduction in damages	$ 850	0	$ 850

9. Benefits (Cont'd)	General	Local	Total
Savings in operating costs	$1,150	0	$1,150
Recreational Craft			
Increase use to existing fleet	4,800	4,800	9,600
New boats added	2,850	2,850	5,700
	$9,650	$7,650	$17,300
	56%	44%	100%

10. Benefit-Cost Ratio: $\frac{\$17,300}{13,750} = 1.3$

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U. S. ARMY ENGINEER DIVISION, NEW ENGLAND
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REFER TO FILE NO. NEDED-R

19 February 1965

COHASSET HARBOR
COHASSET, MASSACHUSETTS

DETAILED PROJECT REPORT

AUTHORITY

1. This Detailed Project Report is submitted pursuant to authority contained in Section 107 of the River and Harbor Act of 1960. Further authority was provided by 1st Indorsement, dated 3 April 1963, from the Chief of Engineers.

PURPOSE AND EXTENT OF STUDY

2. This study was made to determine the need for modification of the existing Federal navigation project at Cohasset Harbor. A public hearing was held at Cohasset Harbor on 22 March 1962 to determine the improvements desired by local interests. Office and field investigations, economic and engineering studies were made of improvements requested by local interests. Alternative plans that would meet the needs of present and prospective needs of navigation in the harbor in the most economical manner were considered and developed. A hydrographic survey consisting of soundings and random probings was made in May 1963 from which the character and estimated quantities of materials were determined. In view of the presence of rock in the study area, a detailed probing survey was made in August-September 1964 to supplement previous data and to serve as a basis for developing an economical plan of improvement. Data concerning the waterborne commerce and boating activities in the harbor were obtained through questionnaires distributed to local interests and from inspection of the harbor during the study period.

3. All Federal, State and local agencies interested or affected by improvement of the harbor were contacted. Conferences were held with local officials to discuss the considered improvements and requirements of local cooperation.

DESCRIPTION OF NAVIGATION CONDITIONS

4. Cohasset Harbor is on the shore of Massachusetts, 16 miles southeast of Boston Harbor and 4.5 miles northwest of the Federally improved Harbor at Scituate. The harbor, located in the Towns of Cohasset and Scituate, consists of an outer roadstead and an improved inner harbor connected by a dredged channel, about one-half mile long, 90 feet wide and 8 feet deep. The inner harbor is exposed to northeasterly winds but is partially protected by a breakwater built by the Commonwealth of Massachusetts.

5. The existing Federal project provides about 18 acres of anchorage space, 7 feet deep. In addition, local interests have improved the inner harbor to provide an additional 6 acres of anchorage space, 6 feet deep. Allowing for fairways, the effective area for mooring is reduced to about 20 acres, if maintained. In view of shoaling, which has occured in the inner coves of the harbor, the present anchorage area 6 feet deep or more is about 18 acres.

6. The inner harbor serves as a place of refuge for fishermen during bad weather, provides mooring areas for racing class sailing boats, yachts, recreational, fishing and transient craft. At the present time, the number of vessels constituting the various fleets that use Cohasset Harbor total in excess of 700.

TRIBUTARY AREAS

7. The towns adjoining Cohasset are Hingham, Scituate and Norwell. Several of the lobster fishermen from these adjacent towns use Cohasset Harbor as the base for their fishing operations. Fishing, agriculture on a small scale, and the business incidental to yachting and summer vacationists' trade form the principal sources of revenue for this locality.

8. Cohasset Harbor is used by yachtsmen from such points as Boston, Marblehead and other places along the shores of Massachusetts Bay. This harbor is also used by shore fishermen whose operations are confined to that portion of Massachusetts Bay between Minots Ledge Light and Graves Light. The fishing boats, which are part of the fishing fleet from Boston and Gloucester, find it convenient to lie in Cohasset Harbor overnight to procure supplies, or to take refuge, especially if forced to seek shelter from a northeast storm while in the vicinity.

9. The nearest adjacent harbors for small fishing and recreational craft are in Hingham Bay, 10 miles to the northwest and Scituate Harbor,

4.5 miles to the southeast. Scituate and Hingham Harbors have been improved by the United States. The present demand for boating facilities in Massachusetts and the increase in leisure time and money available for recreation contribute greatly to the insufficiency of present facilities for recreational craft in the area. Specifically, the facilities in both harbors are used to capacity and there remains a need for further improvement in this area. Cohasset Harbor is one of the possible locations where improvement is feasible.

10. The immediate area is served by the New York, New Haven and Hartford Railroad. The principal highway in the town of Cohasset is Route 3A, running south and northeast. The Plymouth and Brockton Street Railway Company provides bus service between Boston and Plymouth with stops in Cohasset.

BRIDGES

11. There are no bridges crossing any portion of the waterway under consideration in this report.

PRIOR REPORTS

12. Cohasset Harbor has been the subject of four studies, two of which resulted in improvement of the harbor. The latest report on the harbor was made in 1939 and is published as House Document No. 425, 76th Congress, 1st Session. The recommendations therein form the basis of the existing Federal project adopted by the River and Harbor Act of 2 March 1945.

EXISTING CORPS OF ENGINEERS PROJECT

13. The existing project for Cohasset Harbor adopted by the River and Harbor Act of March 2, 1945, was completed in July 1960. It provides for an anchorage area in the inner harbor approximately 18 acres in area, 7 feet deep at mean low water and a channel 90 feet wide, 8 feet deep at mean low water extending from the anchorage area to the outer harbor. Federal expenditures under the existing project have been $133,988, all for new work.

LOCAL COOPERATION ON EXISTING PROJECTS

14. The existing project was authorized subject to the [illegible] conditions that local interests would:

a. Give assurances satisfactory to the Secretary of War that they will make available to public use, on equal and reasonable terms, a wharf and other landing facilities.

b. Release the United States from claims for damages attributable to the work of improvement.

c. Contribute one-third the first cost, but not to exceed $30,000.

Local interests complied with and fulfilled all of the above requirements prior to construction of the Federal project in 1960.

OTHER IMPROVEMENTS

15. Since 1910 the Commonwealth of Massachusetts, in cooperation with the Town of Cohasset and private interests, deepened the entrance channel to 6 feet, dredged an anchorage in the inner harbor 1,100 feet long, 300 feet wide, 6 feet deep, and constructed an 800-foot breakwater at the entrance to the inner harbor. The Commonwealth has done additional dredging at irregular intervals since that time, some for the purpose of maintenance. The most recent work was redredging of the inner 6-foot basin in 1953 at a cost of about $35,000 and dredging of a 6-foot anchorage in Bailey Creek in 1958 at a cost of about $105,000. Available records indicate that State and local interests have expended in excess of $250,000 for improvement of the harbor over and above those facilities provided by the Federal project. Some private dredging has been done in the inner harbor under Federal permits.

TERMINAL AND TRANSFER FACILITIES

16. The Town of Cohasset maintains four piers as public landings, three in the inner cove area and one at Government Island, all of pile and timber construction. Three of these piers are used for docking and berthing of tenders, one is used for loading and unloading of passengers. The four public piers are open to the public without charge.

17. Kimball's Restaurant and Hugo's Lighthouse Restaurant are located on the inner cove and both establishments operate a pier and float at which visitors and guests are allowed to berth their vessels. As many as 10-15 visiting craft are berthed at each pier at meal times during the summer seasons. Other piers in the harbor for commercial and recreational craft are those operated by the Cohasset Boat Yard, the Cohasset Sailing club and the Cohasset Yacht Club; the Brancroft

Wharf or fuel dock with facilities for servicing boats with gasoline, oil, water, and for the sale of commodities pertinent to lobster and fishing business; and the Fisherman's Landing in Bailey Creek. Several private piers are also located along the shore of the harbor.

IMPROVEMENT DESIRED

18. In order to determine the extent of improvement desired, a public hearing was held at Cohasset, Mass. On 22 March 1962. Local interests desired improvement by dredging in Cohasset Cove to increase its usefulness for maneuvering of small boats and to provide additional area for anchorage of the commercial fishing fleet at the head of the cove. They requested dredging in Bailey's Creek to increase the anchorage for recreational boating.

19. The hearing was well attended by town officials, representatives of the various recreational interests, and the commercial fishing interests. Substantial data was submitted on present use of the harbor by fishing and recreational craft, the difficulties encountered due to lack of adequate anchorage space for the present fleets and the anticipated expansion or growth of the fleets.

20. The major problem cited by the local interests is the lack of anchorage space for the large fleets of vessels based in the harbor. The Cove and the Government Island area are used by the fishing vessels for their operations and moorings due to the proximity of the public landings. In view of the limited space and the traffic by recreational craft in the Cove, the fishing vessels often are caused to ground out on the banks thus incurring delays to their operations or are forced to maneuver slowly between moored craft resulting in delay or damage due to collisions. Local interests expressed an urgency for providing adequate mooring facilities for the fishing fleet. Lack of sufficient anchorage in the remaining portions of the harbor is claimed to have resulted in crowded conditions which not only has caused damages and inconvenience to recreational craft but has hampered the growth of the present fleet.

21. A representative of the Cohasset Yacht Club described the inadequate facilities which the harbor provides for the increasing number of recreational craft that use the harbor. It was mentioned also that the breakwater, at the entrance to Cohasset Harbor, which was built by the Commonwealth of Massachusetts in 1910-1911, has settled to such an extent that at high tide the breakwater is inundated and offers limited protection to the harbor during a northeasterly storm.

22. Local interests have been consulted during the study and have reiterated their desire for channel and anchorage improvements.

COMMERCIAL AND VESSEL TRAFFIC

23. Lobster fishing constitutes an important part of the harbor activities. Local interests have furnished detailed data showing that there are 34 lobster boats ranging in size from 27 to 48 feet with drafts in excess of 3 feet based in Cohasset Harbor. These vessels are reported to have a gross value of $92,400. Other investments in traps, fishing gear, lobster trucks and other appurtenances to the fishing industry amount to $107,800. The total lobstermen's investment in the industry is reported in excess of $200,000. All of the lobster catch by the fishermen is landed in Cohasset Harbor. It is reported that the average catch ranges from 170 to 270 tons per year, having a gross value of $187,000 to $300,000 per year. In addition, 3 charter fishing party boats valued at $23,000 and 1 moss boat valued at $3,500 operate out of Cohasset Harbor.

24. Cohasset Harbor is an attractive summer resort area and is used extensively by recreational craft. The Harbor Master and the Cohasset Yacht Club report that the existing recreational fleet based in the harbor is made up as follows:

Type	Size	Total No.	Total Value
Rowboats	8' - 16'	310	$ 13,450
Outboards	10' - 20'	95	72,500
Inboards	10' - 20'	32	50,500
Cruisers	15' - 30'	33	96,000
	31' - 50'	22	307,000
Aux. Sails	15' - 30'	14	67,500
	31' - 40'	7	109,000
	41' - 60'	5	133,000
Sailboats	Under 10'	53	8,000
	10' - 20'	52	46,000
	20' - 30'	40	91,000
Totals*		353	$980,500

*Exclusive of rowboats

In addition, the Harbor Master reports that 130 transient vessels visit the harbor during the boating season for stays of 1 to 2 days each.

25. A summary of all vessels based at Cohasset Harbor that require anchorage facilities are as follows:

Lobster boats		34
Moss boats		1
Recreational charter fishing boats	3	
Outboards	95	
Inboards	32	
Cruisers	55	
Auxiliary sails	26	
Sailboats	92	
	303	303
Total vessels		338

The rowboats numbering 310 and the 53 small sailboats under 10 feet in length are of the type that can be either tied up at a wharf or moored in the more shallow areas close to shore. The combined locally based fleet therefore, consists of 701 vessels of all classes and types.

DIFFICULTIES ATTENDING NAVIGATION

26. The principal difficulty attending navigation is insufficient space with adequate depths in Cohasset Cove, particularly for the fishing vessels, which due to crowded conditions, must anchor close to the bank, and are subject to damages from passing vessels. Limited anchorage with adequate depths throughout the remainder of the harbor results in crowding under present conditions and restricts possible further expansion of the fleets.

WATER POWER AND OTHER SPECIAL SUBJECTS

27. There are no problems pertaining to water power or flood control. The U. S. Fish and Wildlife Service has reported that neither sport-fish nor shellfish resources will be significantly damaged by the construction features. Dredging in Bailey Creek and disposition of spoil materials on marshes in the vicinity of Bailey Creek could cause significant waterfowl habitat losses since the wetlands at the east end of the Bailey Creek arm of the harbor and eastward are of high value to waterfowl. The U. S. Fish and Wildlife Service has reported also, that except for the Bailey Creek arm, the harbor is heavily polluted.

The report by the United States Fish and Wildlife Service is included in Appendix C of this report.

PLAN OF IMPROVEMENT

28. In order to develop a plan of improvement that would meet the needs of navigation in the harbor in the most economical manner, a review of existing conditions is made. At the present time the locally based fleet numbers in excess of 700 vessels. Of this total, 310 are rowboats and 53 are small sailboats under 10 feet in length. These vessels are of such size and draft that space with natural depths of water sufficient to float them would be available in areas between the shore and outside any proposed project limit. The net number of boats in the existing fleet for which anchorage space is desirable is 338. Under existing conditions, about 18 acres of water area has depths in excess of 6 feet, and about 20 acres with depths in excess of 3 feet. In view of the various types and sizes of vessels in the fleet, it is considered that the 20 acres are used effectively. On this basis, the boats are moored on an average of about 17 boats per acre which would substantiate the claim of crowded conditions in the harbor.

29. Effective mooring of vessels, made and controlled by the harbor master, should be according to class and type of vessels so that vessels predominantly influenced by winds would not interfere with those predominantly influenced by currents. On this basis, it is considered that a saturation of 12 boats per acre would be satisfactory.

30. Several plans of improvement were considered in this study. The maximum development of the harbor that could be reasonably made would provide about 23 acres of anchorage in addition to the 18 acres provided by the existing project. The minimum plan would be that area required to reduce present congestion to about 12 boats per acre or a total of 28 acres or 10 acres in addition to those included in the existing project. The plans of improvement considered are described as follows:

Plan 1 - A channel 75 feet wide, 6 feet deep into Cohasset Cove with a turning basin at the head of the cove to provide 4.5 acres, 6 feet deep, an area of about 2.5 acres south of the existing Federal anchorage, 6 feet deep, and a channel 90 feet wide, 6 feet deep into Bailey Creek to an anchorage area of about 12 acres. Total anchorage space - 19.0 acres.

Plan 2 - A channel 60 feet wide, 500 ft. long, 6 ft. deep, into Cohasset Cove; an anchorage area of about 2 acres 6 feet deep west and south of the existing project and removal of the western end of Bassing Beach to provide about 12 acres of anchorage, 6 feet deep. Total anchorage space - 14 acres. For this plan, Bassing Beach, owned by the Town of Scituate must be obtained by the [illegible] the Town of Cohasset.

Plan 3 - Anchorage area of 4.2 acres, 6 feet deep in Cohasset Cove; anchorage area of about 3.5 acres west and south of the existing anchorage, 6 feet deep and an anchorage area of about 5.3 acres in Bailey Creek. Total anchorage space - 13 acres.

Plan 4 - Anchorage area of 3.9 acres, 6 feet deep in Cohasset Cove; an anchorage area 3.3 acres, 6 feet deep, west and south of the existing anchorage and an anchorage of 5,4 acres, 6 feet deep, in Baileys Creek. Total anchorage space - 12.6 acres.

31. Based on the results of hydrographic surveys, including soundings and probings made in May 1963 and supplemented by a more detailed probing survey in August - September 1964, it was determined that accomplishment of Plans 1, 2 and 3 would involve the removal of ledge rock, with attendant high unit cost of providing an acre of space. Plan 4 would provide the anchorage area equivalent or commensurate with Plans 2 and 3 but at a lower unit cost per acre since rock removal is not involved in the plan.

32. Each of the four plans would relieve present overcrowding in the harbor, would provide more anchorage and maneuvering space for the fishing vessels as primarily desired by local interests and permit expansion of the present fleets of recreational craft.

33. The relative merits and costs of each plan were discussed with State and Town officials. Consideration of all the factors, advantages and and disadvantages of each plan, it was concluded that Plan 4 would meet the primary need of providing the maximum space in Cohasset Cove for fishing vessels and would permit the best use of the remainder of the harbor at the most economical cost to the United States and to the participating local interests. The proposed plan (Plan 4) is shown on the attached map. Since the alignments of the other plan were only variations of Plan 4, they are described only and are not shown on the map.

34. Consideration was given to improvement of the breakwater. The breakwater is inundated during the high stages of tide and strong wind, however, severe wave action occurs infrequently. Further, the larger vessels are anchored in the lee of the structure and are able to withstand resultant wave action in the anchorage. It is therefore considered that benefits to be derived from improvement of the breakwater are relatively small and insufficient to warrant further consideration.

SHORELINE CHANGES

35. The proposed dredging in Cohasset Harbor will have no adverse effects on the configuration of the adjacent shoreline.

REQUIRED AIDS TO NAVIGATION

36. The Coast Guard has been consulted and reports that no additional aids to navigation would be required due to the improvement.

ESTIMATES OF FIRST COSTS

37. Estimates of first costs have been developed for each of the four plans. These estimates are given in detail in Appendix A. Dredged quantities for each plan were computed in terms of in-place measurements as determined from hydrographic and probing surveys made in 1963-1964 in connection with this study. The materials to be removed are mud, sand, gravel and clay and in connection with Plans 1, 2 and 3 some ledge removal. Estimates of cost for dredging of all plans were based on removal by a bucket dredge with disposal of the materials at sea. Unit prices used are those prevailing for such work in January 1965.

38. Estimates of first costs for Plans 1, 2, and 3 are summarized as follows:

	Plan 1 (19 acres)	Plan 2 (14 acres)	Plan 3 (13 acres)
Quantity			
Dredging	230,000 c.y.	245,000 c.y.	72,000 c.y.
Ledge Removal	6,900 c.y.	1,800 c.y.	1,150 c.y.
Contract Cost (1)	$718,000	$528,000	$242,000
Engineering and Design	30,000(2)	30,000(2)	30,000(2)
Supervision and Administration	57,000	42,000	20,000
Total Estimated Cost	$805,000	$600,000	$292,000

	Plan 1 (19 acres)	Plan 2 (14 acres)	Plan 3 (13 acres)
Aids to Navigation	0	0	0
Lands	0	50,000	0
Total Project Cost (Federal and Non-Federal)	$805,000	$650,000	$292,000

(1) Includes contingency allowance
(2) Includes $22,000 for project study cost

Federal Cost

Percent of Construction Cost	53	54	55
Project Cost	200,000(3)	200,000(3)	161,000

Non-Federal Cost

Percent	47	46	45
Cash Contribution	$378,000	$276,000	$131,000
Excess over Federal limit	227,000	124,000	0
Lands	0	50,000	0
Total	$605,000	$450,000	$131,000

(3) Federal Limit

39. The estimate of first cost of Plan 4, the proposed plan, is given below.

		Estimated Cost (Jan. 1965)
Dredging 12.6 acres of anchorage 6 feet deep		$175,000
Engineering and Design		30,000
Supervision and Administration		15,000
Total Estimated Cost of Construction		$220,000
Aids to Navigation		0
Total Estimated Project Cost (Federal and Non-Federal)		$220,000
Total Non-Federal Cost		
Cash Contribution	- $97,000	
Public Landing	- 0	
Total		$ 97,000

	Estimated Cost (Jan. 1965)
Total Estimated Federal Cost	
Corps of Engineers	$123,000
U. S. Coast Guard	0
Total	$123,000

ESTIMATE OF BENEFITS

40. Cohasset Harbor is divided into four separate segments. Two of these areas are used by the local fishing fleet of 34 boats and by other fishing craft who operate offshore and take refuge in the harbor during storms. These areas are the Cohasset Cove in which about 75% of the fleet is moored and the Government Island area which accommodates the remaining 25%. Visiting fishing craft and those seeking refuge utilize the latter area. Benefits have been evaluated for the local fleet only since it is considered that expansion of available anchorage will make for better convenience to other fishing craft with no significant tangible benefit.

41. The improvements under consideration are not anticipated to result in any increase in the amount of fish catch. It is claimed by local interests that due to crowded conditions fishing vessels suffer damages due to collision and are often times delayed in leaving and entering the harbor and approaches to the town piers to unload their catch. Under present conditions, fishing vessels are forced to moor close to or on the banks of Cohasset Cove, which at times results in damages to the propellors, propellor shafts and hull. Maneuvering through anchored boats to enter and leave the harbor often results in minor collisions with those vessels resulting in damages to either or both vessels. It is conservatively estimated that average annual damages to vessels subjected to these conditions would amount to at least $50 per boat. Relief of overcrowding in the Cove would eliminate at least one half of these damages. Benefits due to reduction of damages to fishing vessels are estimated at ($50 x 34 boats x 50%) $850.00.

42. Lost time to fishing vessels when grounded out or maneuvering to and from the wharf and to the fishing grounds result in higher operating expenses. Data presented at the hearing show that the existing fleet of 34 boats land an annual catch of 170 to 270 tons of lobsters.

Using an average annual catch of 225 tons, the annual catch per vessel would amount to about 13,200 lbs.. It is estimated that with an allowance for lay-over days and bad weather each vessel will average 17 trips per month or (17 x 12) about 200 trips per year. The total number of trips in and out of the harbor by the entire fleet is 34 x 200 or 6800. It is estimated that delays due to grounding out and maneuvering to leave will range from 0 to 3 hours waiting for sufficient tide to float the vessels averaging 1.5 hours. At the present time, three-fourths of the fishing fleet anchors in Cohasset Cove and are subject to groundings. Delays to the existing vessels are estimated to occur 10% of the time for 75% of the vessels. Local interests furnished data on the annual operating expense of a fishing vessel as being $3,000. On the basis of 200 trips per year at 10 hours per trip, the hourly operating expense, exclusive of labor, is determined to be $1.50 per hour. The value of delays due to grounding and inconvenience due to maneuvering is determined to be (34 x 3/4 x 20 x 1.5 x $1.50) $1150. The benefits to the fishing fleet considered to be general in character are as follows:

Reduction in vessel damage	850
Saving in operating expense	1150
Total	$2000

43. Benefits for recreational boats have been computed on the basis of annual net return to boat owners if the boats were "for hire". In general, the net return varies with the type and size of boat and is expressed in terms of its average depreciated value. The ideal net return is considered the maximum return that could be obtained with full unrestricted use of the harbor. For this harbor, the ideal net return varies from 12 percent for the smaller boats to 7 percent for the larger boats. Fourteen percent was taken for the few large charter boats. Benefits to the existing fleet is the difference between the estimated net return now received and the net return that could be reasonably expected after improvement. The largest net gain in benefits were taken for the deeper draft cruisers, as removal of the channel shoals would permit their use of the entire harbor waterway.

44. Benefits are expected to accrue to 303 of the 356 vessels comprising the existing recreational fleet. The evaluation of these benefits shown in Table I amount to $9,600. These benefits will accrue to the existing fleet under all four plans of improvement considered.

45. Local interests have indicated that due to lack of space, applications for moorings in the harbor have been denied. Although their

TABLE I BENEFITS TO RECREATIONAL BOATING - EXISTING FLEET
(ALL PLANS)

HARBOR: COHASSET DATE: Aug. 1964

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise (120 day season) Avg. Days	On Cruise (120 day season) % of Season	On Cruise (120 day season) Value $
Recreational Fleet												
Outboards	10-20	95	760	72,500	12	90	100	1.2	870	-	-	-
Inboards	10-20	32	1,580	50,500	12	90	100	1.2	606	-	-	-
Cruisers	15-30	33	2,900	96,000	8	90	100	0.8	768	10	8	61
	31-50	22	16,200	357,000	8	85	100	1.2	4,284	14	12	514
Aux. Sail	15-30	14	4,800	67,500	8	90	100	0.8	540	8	7	38
	31-40	7	15,600	109,000	8	90	100	0.8	872	12	10	87
	41-60	5	26,600	133,000	7	85	100	1.1	1463	14	12	175
Sailboats	10-20	52	890	46,000	11	90*	95*	0.55	253	-	-	-
	21-30	40	2,280	91,000	11	90*	95*	0.55	500	6	5	25
Charter Boats												
Cruisers	21-35	1	3,000	3,000	14	90	100	1.4	42	-	-	
	36-50	2	10,000	20,000	14	90	100	1.4	280	-	-	
TOTALS		303		1,045,500					10,478			890 = $9,588
												Say $9,600

*Long entrance channel

immediate concern is to provide adequate space for the present fishing and recreational fleets, they requested consideration be given to the future expansion of the recreational fleet.

46. On the basis of an ultimate saturation of 12 boats per acre with an improved harbor, the extent of expansion of the existing recreational fleet is computed for each plan. The existing fleet of craft, consisting of 34 fishing boats, moss boat and 303 recreational craft, totals 338 boats requiring about 28 acres. Allowing about 1/2 acre of space for transient craft the area that would be available for future growth of the fleet is tabulated as follows:

	Anchorage Space (acres)					
Plan	Existing	Additional Under plan	Total Available	Req'd by Existing Fleet	Available for Growth	Possible Expansion of Fleet
1	18.0	19.0	37.0	28.5	8.5	102
2	18.0	14.0	32.0	28.5	3.5	42
3	18.0	13.0	31.0	28.5	2.5	30
4	18.0	12.6	30.6	28.5	2.1	25

47. The composition of the prospective fleet for each plan considered is computed on the basis that proportions of the various classes of boats would be the same as the present fleet. The future additional boats anticipated under each plan is tabulated as follows:

	Existing	% of	Anticipated Future Additions			
Type	Fleet	Fleet	Plan 1	Plan 2	Plan 3	Plan 4
Outboards	95	31.7	32	13	10	9
Inboards	32	10.7	11	4	3	3
Cruisers (15-30)	33	11.0	11	5	3	3
Cruisers (31-50)	22	7.3	7	3	2	2
Aux. Sail (15-30)	14	4.7	5	2	1	1
Aux. Sail (31-40)	7	2.3	2	1	1	0
Aux. Sail (41-60)	5	1.7	2	1	1	0
Sailboats (10-20)	52	17.3	18	7	5	4
Sailboats (21-30)	40	13.3	14	6	4	3
	300	100.0	102	42	30	25
Time required to develop after completion of project (Based on 5% increase/yr.)			5 Yrs.	2 Yrs.	1.5 Yr.	1 Yr.

TABLE II BENEFITS TO RECREATIONAL BOATING - NEW BOATS - PLAN 1

HARBOR: COHASSET

DATE: Aug. 1964

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise (120 day season) Avg. Days	On Cruise (120 day season) % of Season	On Cruise (120 day season) Value $
Recreational Fleet												
Outboards	10-20	32	800	25,600	12	0	100	12	3,072			
Inboards	10-20	11	1,600	17,600	12	0	100	12	2,012			
Cruisers	15-30	11	3,000	33,000	8	0	100	8	2,640	10	8	211
	31-50	7	16,000	102,000	8	0	100	8	8,160	14	12	979
Aux. Sail	15-30	5	5,000	25,000	8	0	100	8	2,000	8	7	140
	31-40	2	15,000	30,000	8	0	100	8	2,400	12	10	240
	41-60	2	27,000	54,000	7	0	100	7	3,780	14	12	454
Sailboats	10-20	18	900	16,200	11	0	95	10.5	1,701	-	-	-
	21-30	14	2,500	35,000	11	0	95	10.5	3,675	6	5	184
TOTALS		102		338,400					$29,440			$2,208 = $27,232
												Say $27,250

TABLE III BENEFITS TO RECREATIONAL BOATING - NEW BOATS - PLAN 2

HARBOR: COHASSET

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise Avg. Days	On Cruise % of Season	On Cruise Value $
Recreational Fleet												
Outboards	10-20	13	800	10,400	12	0	100	12	1,248			
Inboards	10-20	4	1,600	6,400	12	0	100	12	768			
Cruisers	15-30	5	3,000	15,000	8	0	100	8	1,200	10	8	96
	31-50	3	16,000	48,000	8	0	100	8	3,840	14	12	460
Aux. Sail	15-30	2	5,000	10,000	8	0	100	8	800	8	7	56
	31-40	1	15,000	15,000	8	0	100	8	1,200	12	10	120
	41-60	1	27,000	27,000	7	0	100	7	1,890	14	12	227
Sailboats	10-20	7	900	6,300	11	0	95	10.5	662	-	-	-
	21-30	6	2,500	15,000	11	0	95	10.5	1,575	6	5	79
TOTALS		42		$153,000					$3,183			$1,038 = $12,145
												Say $12,150

TABLE IV BENEFITS TO RECREATIONAL BOATING - NEW BOATS - PLAN 3

HARBOR: COHASSET

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise Avg. Days	On Cruise % of Season	On Cruise Value $
Recreational Fleet												
Outboards	10-20	10	800	8,000	12	0	100	12	960			
Inboards	10-20	3	1,600	4,800	12	0	100	12	576			
Cruisers	15-30	3	3,000	9,000	8	0	100	8	720	10	8	58
	31-50	2	16,000	32,000	8	0	100	8	2,560	14	12	307
Aux. Sail	15-30	1	5,000	5,000	8	0	100	8	400	8	7	28
	31-40	1	15,000	15,000	8	0	100	8	1,200	12	10	120
	41-60	1	27,000	27,000	7	0	100	7	1,890	14	12	227
Sailboats	10-20	5	900	4,500	11	0	95	10.5	473	-	-	-
	21-30	4	2,500	10,000	11	0	95	10.5	1,050	6	5	53
TOTALS		30		$115,300					$9,829			$793=$9,036
												Say $9,000

TABLE V BENEFITS TO RECREATIONAL BOATING - NEW BOATS - PLAN 4

HARBOR: COHASSET

Type of Craft	Length (feet)	No. of Boats	Depreciated Value Average $	Depreciated Value Total $	Ideal	Percent Return % of Ideal Pres.	Percent Return % of Ideal Ftr.	Gain	Value $	On Cruise Avg. Days	On Cruise % of Season	On Cruise Value $
Recreational Fleet												
Outboards	10-20	9	800	7,200	12	0	100	12	864			
Inboards	10-20	3	1,600	4,800	12	0	100	12	576			
Cruisers	15-30	3	3,000	9,000	8	0	100	8	720	10	8	58
	31-50	2	16,000	30,000	8	0	100	8	2,400	14	12	288
Aux. Sail	15-30	1	5,000	5,000	8	0	100	8	400	8	7	28
Sailboats	10-20	4	900	3,600	11	0	95	10.5	378	-	-	-
	21-30	3	2,500	7,500	11	0	95	10.5	787	6	5	40
TOTALS		25		$67,100					$6,125			$414 = $5,711
												Say $5,700

48. The benefits that are expected to accrue through expansion of the recreational fleet under each of the considered plans are given in Tables II, III, IV, and V. The benefits evaluated for each plan are considered to accrue within 5 years of project completion and considered to represent the average annual benefit over the life of the project.

49. Benefits to the existing transient fleet are considered to be negligible. It is not expected that the improvement will increase the number of transients to the harbor.

50. In summary, benefits evaluated as accruing to the fishing fleet are considered to be entirely general in nature and the benefits accruing to the recreational are considered to be 50% general and 50% local. Benefits estimated to accrue under each plan are tabulated as follows:

Plan 1	Total	General	Local
Fishing Fleet			
Reduction in damages	$ 850	$ 850	-
Savings in operating expense	1,150	1,150	-
Recreational Craft			
Existing Fleet	9,600	4,800	4,800
Added fleet (102 boats)	27,250	13,625	13,625
Total	$38,850	$ 20,425	$18,425
Percent of Total		53%	47%

Plan 2	Total	General	Local
Fishing Fleet			
Reduction in damages	$ 850	$ 850	-
Savings in operating expense	1,150	1,150	-
Recreational Craft			
Existing Fleet	9,600	4,800	4,800
Added fleet (42 boats)	12,150	6,075	6,075
Total	$23,750	$12,875	$10,875
Percent of Total		54%	46%

Plan 3	Total	General	Local
Fishing Fleet			
Reduction in damages	$ 850	$ 850	-

Plan 3 (Cont'd)	Total	General	Local
Savings in operating expense.	1,150	1,150	-
Recreational Craft			
Existing Fleet	9,600	4,800	4,800
Added fleet (30 boats)	9,000	4,500	4,500
Total	$20,600	$11,300	$9,300
Percent of Total		55%	45%

Plan 4

Fishing Fleet			
Reduction in damages	850	850	
Savings in operating expense	1,150	1,150	
Recreational Fleet			
Existing Fleet	9,600	4,800	4,800
Added fleet (25 boats)	5,700	2,850	2,850
Total	$17,300	$9,650	$7,650
Percent of total		56%	44%

ESTIMATE OF ANNUAL CHARGES

51. Annual charges for the improvement have been estimated on the basis of 50-year project life with Federal and non-Federal interest rates of 3-1/8 percent. Additional average annual maintenance charges are based on past experience with the existing project. Based on past record, the average rate of shoaling amounted to 215 cubic yards per year per acre. On this basis the estimated average annual maintenance for each plan is determined to be as follows:

Plan 1 - 19 acres @ 215 c.y./yr.	-	$8,000
Plan 2 - 14 acres @ 215 c.y./yr.	-	$6,000
Plan 3 - 13 acres @ 215 c.y./yr.	-	$5,600
Plan 4 - 12.6 acres @ 215 c.y./yr.	-	$5,000

52. The average annual charges for each plan is computed as follows:

	Plan 1	Plan 2	Plan 3	Plan 4
Investment				
Federal				
Corps of Engineers	$200,000	$200,000	$161,000	$123,000
U.S. Coast Guard	0	0	0	0
Total Federal	$200,000	$200,000	$161,000	$123,000

	Plan 1	Plan 2	Plan 3	Plan 4
Non-Federal				
Cash Contribution	$378,000	$276,000	$131,000	$ 97,000
Excess over Federal limit	227,000	124,000	0	0
Lands	0	50,000	0	0
Total Non-Federal	$605,000	$450,000	$131,000	$ 97,000
Annual Charges				
Total Investment (F&NF)	$805,000	$650,000	$292,000	$220,000
Capital Recovery Factor 3-1/8% - 50 yrs.	.03979	.03979	.03979	.03979
Interest & Amortization	$ 32,030	$ 25,860	$ 11,620	$ 8,750
Added Maintenance	8,000	6,000	5,600	5,000
Total Average Annual Charges	$ 40,030	$ 31,860	$ 17,220	$ 13,750

COMPARISON OF BENEFITS AND COSTS

53. A comparison of evaluated benefits and costs for each plan is tabulated as follows:

	Plan 1	Plan 2	Plan 3	Plan 4
Acres provided	19	14	13	12.6
Total Estimated Cost	$805,000	$650,000	$292,000	$220,000
Federal	200,000	200,000	161,000	123,000
Non-Federal	605,000	450,000	131,000	97,000
Cost/acre	$ 42,368	$ 46,428	$ 22,384	$ 17,460
Annual Charges	$ 40,000	$ 31,900	$ 17,200	$ 13,750
Benefits	$ 38,850	$ 23,750	$ 20,600	$ 17,300
B/C ratio	0.97	0.74	1.19	1.3
Incremental Charge from Plan 4	$ 26,200	$ 18,100	$ 3,400	
Incremental Benefits from Plan 4	$ 21,550	$ 6,450	$ 3,300	
Incremental B/C ratio	0.82	0.35	0.97	

54. From the above table, it can be concluded that the most feasible plan of improvement for Cohasset Harbor is Plan 4. The other 3 plans considered would provide for greater future growth of the existing fleet with Plan 1 providing the probable ultimate improvement. In view of the presence of ledge rock in the harbor, the high cost of providing the maximum improvement outweighs the benefits to be received from the improvement and therefore is not economically justified. It is concluded that provision for future growth of the recreational fleet beyond that which will be provided by the proposed improvement could be more economically provided through construction of marina facilities.

PROPOSED LOCAL COOPERATION

55. Construction of the improvements considered in the report will require shore access for contractor's equipment and range markers. In view of the material to be removed, which will require use of a bucket or dipper dredge, and the lack of suitable spoil disposal areas on lands within economic distances from the work areas, it is considered that spoil disposal areas would not be required. Local interests will be required to provide without cost to the United States, all lands, easements, and rights-of-way required for construction of the project upon the request of the Chief of Engineers. Local interests should further be required to hold and save the United States free from damages due to the construction work and subsequent maintenance of the project.

56. For projects of improvement for the benefit of small fishing and recreational craft, it is usual to require that a public landing open to all on equal terms be provided. Since the Town of Cohasset presently operates four public landings in the harbor, no additional landings should be required. However, local interests should give assurances that operation and maintenance of the existing landings will be continued without cost to the United States and that they will be open to all on equal terms.

57. The benefits to be derived from improvement of Cohasset Harbor are partly general and partly local in nature. In the case of the Proposed Plan of improvement, the local benefits are estimated as 44% of the total benefits. It is considered that local interests should share in the project costs commensurate with local benefits. It appears equitable to require local interests to make a cash contribution of 44% of the construction cost of the 12.6 acres of additional anchorage provided by the Proposed Plan of Improvement. The local cash contribution is presently estimated at $97,000. Local interests have been consulted and have provided reasonable assurances that the above described requirements of local cooperation would be met. The comments of the State and Town are included in Appendix B.

COORDINATION WITH OTHER AGENCIES

58. All Federal, State and local agencies having interests in the development and use of waterways were notified of the public hearing held in Cohasset, Mass. on 22 March 1962. All agencies that expressed an interest in the harbor were in favor of improvement of the harbor.

59. The United States Coast Guard was advised of the proposed improvement and was requested to comment on aspects pertaining to their interests. By letter of 27 January 1965 the Commander of the First Coast Guard District advised that no additional navigation aid would be required for the improvement being considered. The Regional Office of the United States Fish and Wildlife Service was also requested to comment on the results of this improvement. Their report dated 25 August 1964 is contained in Appendix C.

SCHEDULE FOR DESIGN AND CONSTRUCTION

60. It is estimated that preparation of contract plans and specifications for the proposed improvement will require 5 months. The estimated cost of Engineering and Design is $30,000 of which $22,000 has been allocated and expended for the Detailed Project study. Construction of the project can be accomplished under a single contract in 3 months. Expenditures for the proposed project are as follows:

a. Allocated to date	
Detailed Project Report	$ 22,000
b. Required to Complete	
Plans and Specifications	7,000
Construction, Engineering during construction, Supervision & Administration	191,000
	$ 220,000*

*Including local cash contribution of $97,000

c. Total Project Cost	
Federal	$ 123,000
Non-Federal (cash contribution)	97,000
	$ 220,000

OPERATION AND MAINTENANCE

61. Maintenance of the project will be the responsibility of the United States. It is estimated that periodic dredging will be required every 10 years. The average annual cost of maintenance for the additional improvement is estimated at $5,000.

CONCLUSION

62. The existing anchorage facilities are insufficient for the present fishing fleet and transient fishing and recreational craft. Under present conditions, vessels are obliged to moor in the shallow unimproved areas with the risk of grounding out at low water. In view of the present limited space in the harbor with adequate depths, the growth or expansion of the fishing fleet and the recreational use of the harbor in inhibited.

63. Local interests requested consideration for expansion of anchorage facilities to the greatest extent possible. The present trend in expansion of recreational fleets along the coast of Massachusetts Bay has placed great demands on harbor facilities resulting in capacity use of existing facilities in some locations and overcrowding in others. Cohasset Harbor is considered to be one of the logical locations for improvement for small craft. Several plans of improvement were considered and evaluated from an economic and engineering point of view. From the studies, it is concluded that additional Federal improvement of Cohasset Harbor is warranted, and that the greatest extent to which Federal improvement is justified is in accordance with Plan 4. It is concluded also that facilities for mooring of small vessels beyond that which can be economically justified by a Federal project may be required in the future. However, the conclusion is drawn at this time that such future provision for the expanding recreational fleet may be obtained more economically through construction of marina type facilities.

RECOMMENDATIONS

64. The Division Engineer recommends that further Federal improvement of Cohasset Harbor, Mass., be authorized by the Chief of Engineers under provisions of Section 107 of the River and Harbor Act of 1960 to provide 12.6 acres of anchorage area, 6 feet deep, in addition to that presently provided under the existing authorized Federal project. The total estimated cost of the recommended improvement is $220,000. Annual maintenance cost is estimated at $5,000 in addition to that required for the existing project. The recommendation is made subject to the condition that local interests:

a. Provide without cost to the United States all necessary lands, easements and rights-of-way needed for construction and maintenance of the project.

b. Hold and save the United States free from damages that may result from construction and maintenance of the project.

c. Continue to operate and maintain the existing public landings without cost to the United States and open to all on equal terms.

d. Make a cash contribution of 44% of the first cost of the project, presently estimated at $97,000, to be paid in a lump sum prior to initiation of construction, subject to final adjustment after actual costs have been determined.

Incls
Maps - Plate I, II, and III
Appendix A - Estimates of First Costs
Appendix B - Comments by Local Interests
Appendix C - U.S. Fish and Wildlife Report

APPENDIX A
ESTIMATE OF FIRST COST

1. The first costs are given below for the four plans of improvement considered. Federal construction consists of dredging anchorage areas of various sizes through removal and disposal of ordinary materials, such as mud, sand, gravel, and clay and ledge removal in connection with some of the plans considered.

2. Dredged quantities for each plan are computed in terms of in-place measurement and provide for a project depth of 6 feet below MLW plus an allowance of one-foot of overdepth. Side slopes are computed on the basis of 1 vertical on 1 horizontal, in rock, otherwise, 1 vertical on 3 horizontal. Unit prices are based on prices prevailing in January 1965 for removal of materials by bucket dredge and scow with disposal at sea. The materials to be dredged as determined by probings are predominantly the type. more suitable for economical removal by a bucket dredge. In addition, suitable spoil disposal areas on land within economical pumping distance are not available.

3. The detailed estimates of first costs are as follows:

Plan 1 - (19.0 acres of additional anchorage, 6 feet deep)

Cost Account No.	Item	Estimated Cost (Jan. 1965)
09	Channels	
	230,000 c.y. ord. mat'ls @ $1.50	$345,000
	6,900 c.y. ledge @ $40.00	276,000
	Contingencies 15%	94,000
		$715,000
52	Division Layouts	3,000
30	Engineering and Design	30,000*
31	Supervision and Administration	57,000
	Total Estimated Cost (C of E Project)	$805,000
	U.S. Coast Guard (Aids to Navigation)	0
	Total Estimated Project Cost - Federal and Non-Federal	$805,000

*Includes $22,000 for project study cost

Non-Federal Costs	
Cash Contribution (47% of $805,000)	$378,000
Public Landings (existing)	0
Total	$378,000
Summary of Estimated Cost	
Federal	
Corps of Engineers (53% of $805,000)	427,000
U. S. Coast Guard	0
Total Federal Cost	$427,000
Federal Statutory Limit	200,000
Excess of Federal Limit	$227,000
Non-Federal	
Cash Contribution (47% of $805,000)	$378,000
Public Landings	0
Excess cost of Federal Limit	227,000
Total Non-Federal Cost	$605,000

Plan 2 - (14.0 acres of additional anchorage, 6 feet deep)

Cost Account No.	Item	Estimated Cost (Jan. 1965)
09	Channels	
	245,000 c.y. ord. mat'ls @ $1.50	$368,000
	1,800 c.y. ledge @ $50.00	90,000
	Contingencies 15%	68,000
		$526,000
52	Division Layouts	2,000
30	Engineering and Design	30,000*
31	Supervision & Administration	42,000
		$600,000
	Total Estimated Cost (C of E project)	600,000
	U.S. Coast Guard (Aids to Navigation)	0
	Total Estimated Project Cost - Federal and Non-Federal	$600,000

*Includes $22,000 for project studies

Non-Federal Costs	
Cash Contribution (46% of $600,000)	$276,000

Public Landings (existing)	0
Land acquisition (Bassing Beach)	
10 acres of land @ $5,000/acre	50,000
Total Non-Federal Costs	$326,000

Summary of Estimated Cost

Federal	
Corps of Engineers (54% of 600,000)	$324,000
U.S. Coast Guard	0
Total Federal Cost	$324,000
Federal Statutory Limit	$200,000
Excess of Federal Limit	$124,000

Non-Federal	
Cash Contribution (46% of $600,000)	$276,000
Public Landings (existing)	0
Land Acquisition	50,000
Excess cost of Federal Limit	124,000
Total Non-Federal Cost	$450,000

Plan 3 - (13.0 acres of additional anchorage, 6 feet deep)

Cost Account No.	Item	Estimated Cost (Jan. 1965)
09	Channels	
	72,000 c.y. ord. mat'ls @ $2.00	$144,000
	1,150 c.y. ledge @ $55.00	64,000
	Contingencies	32,000
		$240,000
52	Division Layouts	2,000
30	Engineering and Design	30,000*
31	Supervision & Administration	20,000
	Total Estimated Cost (C of E Project)	$292,000
	U.S. Coast Guard (Aids to Navigation)	0
	Total Estimated Project Cost (Federal and Non-Federal)	$292,000

Non-Federal Cost	$131,000
Cash Contribution (45% of $291,000)	$131,000
Public Landings (existing)	0

Total Non-Federal Cost	$131,000

*Includes $22,000 for project studies

Summary of Estimated Cost

Federal	
Corps of Engineers (55% of $292,000)	$161,000
U.S. Coast Guard	0
Total Federal Cost	$161,000
Non-Federal Cost	
Cash Contribution (45% of $292,000)	$131,000
Public Landings	0
Total Non-Federal Cost	$131,000

Plan 4 - (12.6 acres of additional anchorage, 6 feet deep)

Cost Account No.	Item	Estimated Cost (Jan. 1965)
09	Channels	
	75,000 c.y. ord. mat'ls @ $2.00	$150,000
	Contingencies 15%	23,000
		$173,000
52	Division Layouts	2,000
30	Engineering & Design	30,000*
31	Supervision & Administration	15,000
	Total Estimated Cost (C of E Project)	$220,000
	U. S. Coast Guard (Aids to Navigation)	0
	Total Estimated Project Cost (Federal and Non-Federal)	$220,000
Non-Federal Costs		
	Cash Contribution (44% of $220,000)	$ 97,000
	Public Landings (existing)	0
	Total Non-Federal Cost	$ 97,000

*Includes $22,000 for project studies

Summary of Estimated Cost

Federal	
Corps of Engineers (56% of $220,000)	$123,000
U.S. Coast Guard	0
Total Federal Cost	$123,000
Non-Federal	
Cash Contribution (44% of $216,000)	$ 97,000
Public Landings (existing)	0
Total Non-Federal Cost	$ 97,000

APPENDIX B

The Commonwealth of Massachusetts
Department of Public Works
Office of the Commissioner
100 Nashua Street, Boston 14

December 30, 1964

U. S. Army Engineer Division, New England
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Re: NEDED-R

Attention: P.C. Hyzer, Division Engineer

Dear General Hyzer:

In reply to your letter of December 22, 1964, relative to the proposed improvement of Cohasset Harbor and requesting our comments on same, please be informed that this Department would be willing to meet the requirements of local cooperation subject to the following conditions:

1. The enactment of an enabling statute by the General Court;

2. An appropriation of sufficient funds by the General Court to provide the Commonwealth's share of the local contribution;

3. Execution of a satisfactory Assurance by the Town of Cohasset to the Commonwealth; and

4. Deposit of the town's share of the local contribution with the State Treasurer.

Upon approval of the project and subsequent allotment of the federal funds, we would be happy to file both the necessary enabling bill and the appropriation request with the General Court for its approval.

Satisfaction of the above 3rd and 4th condition are necessarily contingent upon action by the Town of Cohasset.

Sincerely yours,

FRANCIS W. SARGENT
Associate Commissioner

APPENDIX B

TOWN OF COHASSET

OFFICE OF SELECTMEN

COHASSET, MASSACHUSETTS

January 6, 1965

Mr. P. C. Hyzer
Brigadier General, USA
Division Engineer
U. S. Army Engineer Division, New England
424 Trapelo Road
Waltham, Massachusetts

Re: File No. NEDED-R

Dear General Hyzer:

We have your letter of December 22 concerning the proposed improvement of Cohasset Harbor under Section 107 of the River and Harbor Act of 1960.

The Cohasset Board of Selectmen is in complete accord with the recommendations contained in your letter and favors the improvement considered as Plan 4. We definitely feel that the proposed improvement will go a long distance toward meeting the needs, not only of local interests, but also of the many from outside Cohasset and, indeed, from outside Massachusetts, who annually make use of this facility.

We feel certain that Cohasset will be willing and able to meet the requirements of local co-operation set forth in your letter. We already have on hand more than 50% of Cohasset share of $48,500 of the first cost of the project as indicated in paragraph d. and we hopefully anticipate that the remaining $48,500 will be made available by the Commonwealth in accordance with its usual procedures. We will present to the Town Meeting such articles as may be necessary to provide authority to comply with the other requirements of local co-operation.

We would like to express our appreciation of the courteous interest of your representatives who have taken part in the study of this project up to the present time.

Yours very truly,

BOARD OF SELECTMEN

George W. McLaughlin

GEORGE W. McLAUGHLIN
Chairman of the Board

GWM:ef

APPENDIX B

JOHN A. VOLPE
GOVERNOR

THE COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE DEPARTMENT
STATE HOUSE, BOSTON

October 1, 1965

Col. E. J. Ribbs
Acting Division Engineer
New England Division
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts

Dear Col. Ribbs:

After reviewing the various reports available on the proposed project to improve Cohasset Harbor, I hereby give my approval to the project. This approval, of course, is contingent on the willingness of the various parties involved to assume their apportioned share of the cost burden.

Sincerely,

John A. Volpe

Governor

APPENDIX C

UNITED STATES
DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE
59 Temple Place
Boston, Massachusetts 02111

August 25, 1964

Division Engineer
U. S. Army Engineer Division, New England
Corps of Engineers
424 Trapelo Road
Waltham, Massachusetts 02154

Dear Sir:

This is our conservation and development report on fish and wildlife resources in relation to navigation improvements being considered for Cohasset Harbor, Plymouth County, Massachusetts. The study is being made under authority of Section 107 of the River and Harbor Act adopted July 14, 1960. This report was prepared under the authority of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-666 inc.), in cooperation with the Massachusetts Division of Marine Fisheries and the Division of Fisheries and Game. Those agencies concur in the report as indicated in their letters of August 20 and August 4, 1964, respectively.

The plan of improvement being considered includes dredging of six-foot channels and additional anchorage areas for small boats and fishing craft. Dredging in Cohasset Cove and the James River arm of the harbor is intended to provide better access to existing landings. Dredging an anchorage in Bailey Creek is to provide expanded anchorage area for boats using the harbor.

About 60,000 cubic yards of spoil will be involved. Tentative spoil sites are located seaward of Bassing Beach just east of the breakwater, and in the vicinity of a small marshy peninsula on the south side of Bailey Creek.

Sport fish and limited shellfish resources are located in the project area. Wetlands and flats east and south of Bailey Creek are of high value to waterfowl.

Fish and wildlife resources will not be significantly affected by the anchorage and channel dredging being considered.

Placement of spoil upon the area seaward of Bassing Beach will be harmful to existing shellfish resources and would reduce values for waterfowl and shorebirds. This area is a large, sandy flat, exposed at low tide, which extends seaward beyond White Rock. Placing spoil upon the marshy peninsula south of Bailey Creek will result in the filling in of the creek leading from the extensive marshes south of the area, thus reducing fish and wildlife values.

The spoil should be disposed of at sea on the approved dumping ground located about 10.5 nautical miles on a bearing of 84° true from Strawberry Point or

if alternate spoil areas are necessary, spoil should be placed on the Bassing Beach peninsula, or inland from a line between Bryant Point and White Head. At either alternate site the spoil should be placed above mean high water level and within suitable retaining dikes to prevent it from washing into the adjacent flats or channels.

We recommend--

1. That spoil be disposed of at sea on the approved dumping ground off Strawberry Point.

2. That if selection of alternate spoil areas is necessary, spoil be placed on Bassing Beach peninsula or on the area between Bryant Point and White Head.

3. That the alternate spoil areas be located above high water and diked to prevent spoil entering adjacent flats and channels.

Please advise us if your plans change or if spoil areas other than those mentioned above are considered so that we may advise you of the needs for conservation and development of fish and wildlife resources.

Sincerely yours,

Fred L. Jacobson
Acting Regional Director
Bureau of Sport Fisheries & Wildlife

John T. Gharrett
Regional Director
Bureau of Commercial Fisheries

CORPS OF ENGINEERS

U. S. ARMY

N

WINDMILL POINT

WHITE HEAD

ATLANTIC AVE

EXISTING PROJECT
Channel 8 Feet Deep
Anchorage 18 Acres, 7 Feet Deep

COHASSET HARBOR

WHITE ROCK

COHASSET SCITUATE APPROX. TOWN LINE

STATE BREAKWATER

COHASSET YACHT CLUB

BRYANT POINT

COHASSET

COX ESTATE

SCITUATE

TOWN LANDING

COHASSET COVE

KIMBALLS

HUGO'S

TOWN LANDING

OLD SALT HOUSE

FUEL DOCK

LANDING

COHASSET SAILING CLUB

BOAT RAMP

FISHERMAN'S LANDING

TOWN LANDING

COLONIAL FURNITURE CO

COHASSET BOAT YARD

DAM

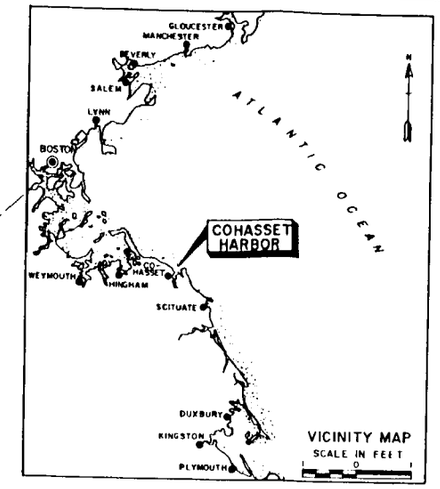
GULF ISLAND
(Government Island Area)

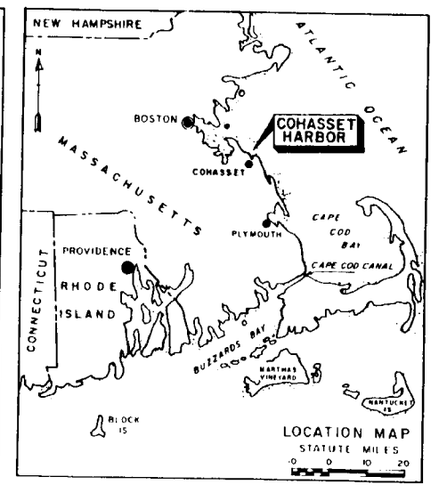
BASSING BEACH

BAILEY CREEK

IMPROVEMENTS CONSIDERED RECOMMENDED

ANCHORAGE AREAS	6 FEET DEEP
Cohasset Cove	3.9 Acres
Cohasset Harbor	3.3 Acres
Bailey Creek	5.4 Acres





U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS, WALTHAM, MASS.

COHASSET HARBOR, MASSACHUSETTS

SHEET 1 OF 1

SCALE IN FEET
200 0 200 400

APPROVED
CHIEF, ENGINEERING DIVISION

SUBMITTED
CHIEF, PLANNING AND REPORTS BRANCH

CHIEF, RIVER AND HARBOR SECTION

PROJECT ENGINEER

DR BY

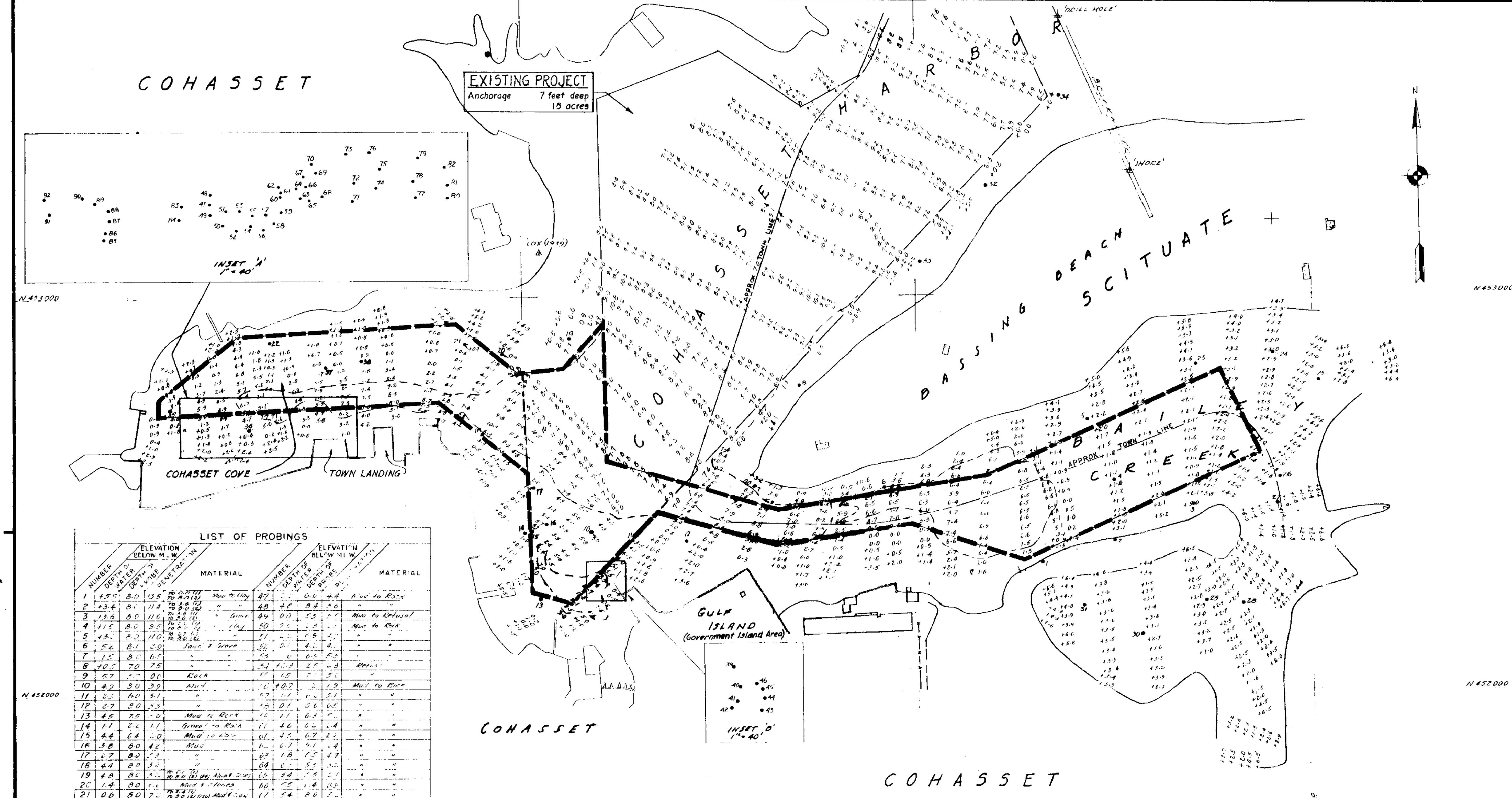
TA BY

CH BY

To Accompany Detailed Project Report Dated 19 FEB 1965

FILE NO. 92-F-3-1

PLATE NO. 1



LIST OF PROBINGS

Number	Elevation below M.L.W. Depth of Water	Depth of Probe	Penetration	Material	Number	Elevation below M.L.W. Depth of Water	Depth of Probe	Penetration	Material
1	+5.5	8.0	13.5	To 0.0 (1) To 8.0 (2) Mud to Clay	47	[illegible]	6.0	4.4	Mud to Rock
2	+3.4	8.0	11.4	To 3.6 (1) To 8.0 (2) " "	48	4.8	8.4	3.6	" "
3	+3.6	8.0	11.6	To 3.6 (1) To 8.0 (2) " Gravel	49	0.0	5.5	5.5	Mud to Refusal
4	+1.5	8.0	9.5	To [illegible] (1) To [illegible] (2) " Clay	50	[illegible]	[illegible]	[illegible]	Mud to Rock
5	+3.0	8.0	11.0	To 2.7 (1) To 8.0 (2) "	51	[illegible]	6.9	[illegible]	" "
6	5.2	8.1	2.9	Sand & Gravel	52	[illegible]	[illegible]	[illegible]	" "
7	1.5	8.0	6.5	" "	53	[illegible]	6.5	5.5	" "
8	+0.5	7.0	7.5	" "	54	+0.3	2.5	2.3	Refusal
9	5.7	5.7	0.0	Rock	55	1.5	[illegible]	5.6	"
10	4.9	8.0	3.9	Mud	56	+0.7	[illegible]	1.9	Mud to Rock
11	2.5	6.0	5.1	"	57	[illegible]	[illegible]	5.1	" "
12	2.7	8.0	5.3	"	58	0.1	0.6	6.5	" "
13	4.5	7.5	[illegible]	Mud to Rock	59	1.1	6.3	[illegible]	" "
14	1.1	2.2	1.1	Gravel to Rock	60	4.0	[illegible]	2.4	" "
15	4.4	6.4	2.0	Mud to Rock	61	4.5	6.7	2.2	" "
16	3.8	8.0	4.2	Mud	62	2.7	9.1	2.4	" "
17	2.7	8.0	5.3	"	63	1.8	6.5	4.7	" "
18	4.4	8.0	3.6	"	64	[illegible]	[illegible]	[illegible]	" "
19	4.8	8.0	3.2	To [illegible] (1) To 8.0 (2) (4) Mud & Stones	65	5.4	[illegible]	2.1	" "
20	1.4	8.0	[illegible]	Mud & Stones	66	5.5	6.4	0.9	" "
21	0.8	8.0	7.2	To 2.4 (1) To 9.0 (2) (20) Mud & Clay	67	5.4	8.6	3.2	" "
22	+1.5	3.5	5.0	Mud to Hard Clay	68	4.4	7.5	3.1	" "
23A	+3.2	3.3	6.5	Mud - Clay - [illegible]	69	5.7	7.4	[illegible]	" "
24A	+2.9	0.2	3.1	Refusal (3)	70	5.8	6.5	0.7	" "
25A	+2.9	0.1	3.0	"	71	2.6	7.1	4.5	" "
26A	+2.3	0.6	2.9		72	4.3	6.1	1.8	" "
27A	+1.5	1.3	2.8	"	73	5.4	7.1	1.7	" "
28A	+1.7	5.3	7.0	"	74	4.5	8.0	3.5	Mud to Clay
29A	+2.8	5.5	8.3	"	75	4.9	6.7	1.8	Mud to Rock (Gravel)
30A	+2.6	5.4	8.0	"	76	6.4	8.2	1.8	" " "
31A	+3.4	4.9	8.3	"	77	5.6	6.0	0.4	Mud to Rock
32	+2.5	3.4	5.9	"	78	5.4	6.9	1.5	" "
33	+4.0	6.2	10.2	"	79	6.8	8.7	1.5	Mud to Gravel
34	+4.7	+1.2	3.5	"	80	5.0	8.5	3.5	Mud to Clay
35	3.5	8.3	4.8	Mud	81	5.6	8.8	3.2	" " "
36	0.7	6.7	6.0	Mud to Rock	82	7.2	9.6	2.4	Clay to Gravel
37	0.2	3.3	3.1	Hard Clay	83	1.7	0.8	[illegible]	Mud to Refusal
38	0.2	6.1	5.9	" "	84	0.3	6.8	6.5	" "
39	7.0	8.5	1.5	Mud to Clay	85	+1.4	+0.8	1.2	Mud to Rock
40	8.6				86	+1.2	2.3	3.5	" "
41	8.7				87	+0.4	2.6	3.0	" "
42	9.3				88	0.1	4.6	4.5	" "
43	5.1	[illegible]	1.0	Mud to Rock	89	1.1	5.1	4.0	" "
44	5.8	7.0	1.2	" "	90	1.8	7.8	6.0	" "
45	5.4	8.0	2.6	Mud	91	+1.4	+0.4	1.0	" "
46	6.4	8.0	1.6	Mud to Clay	92	1.8	6.1	4.3	" "

Probings taken with 3/4" iron pipe forced down by 2 men unless otherwise noted. (1) By hand. (2) Using 20 lb. hammer. (3) Washing 10 minutes without penetration.

LEGEND

ANCHORAGE AREAS 12.6 ACRES - 6 FT. DEEP SHOWN THUS: ▬ ▬ ▬

NOTES

Soundings and probings are in feet and tenths and are referred to the plane of Mean Low Water.

Hydrography from survey of 1-24 May 1963 by J. Rock and party.

Topography from survey of 1-24 May 1963 and previous survey.

Bench Mark 3 (1940) is a standard disc, stamped "No. 3 1940" set in ledge 295 ft. NW of White Head Light and 140 ft. NE of easterly corner of brick house on estate of John Fox. It is 108 ft. SE of Bench Mark 2 and on line with southerly face of house. Elevation is 21.84 feet above Mean Low Water.

Bench Mark 1 (1940) is a standard disc (U.S.C. & G.S.) stamped (No. 1 1940), set in ledge located 345 ft. SW of White Head Light and 93 ft. E of estate of John Fox. It is 151 ft. S of Bench Mark 3. Elevation 18.34 feet above Mean Low Water.

Coordinates are on the Lambert Grid System for Commonwealth of Massachusetts.

Probes shown thus: 34•

Probings taken with 3/4" iron pipe forced down by two men.

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS.

DR. BY WAB | TR. BY GRB | CK. BY [illegible]

COHASSET HARBOR, MASSACHUSETTS

SCALE IN FEET 100 0 100 200 300

A.V. Mannell — PROJECT ENGINEER

[signature] — CHIEF, [illegible] SECTION

SUBMITTED BY: C. E. Bell — CHIEF, PLANNING & REPORTS BRANCH

APPROVED: [signature] — CHIEF, ENGINEERING DIV.

DATE MAY 1964

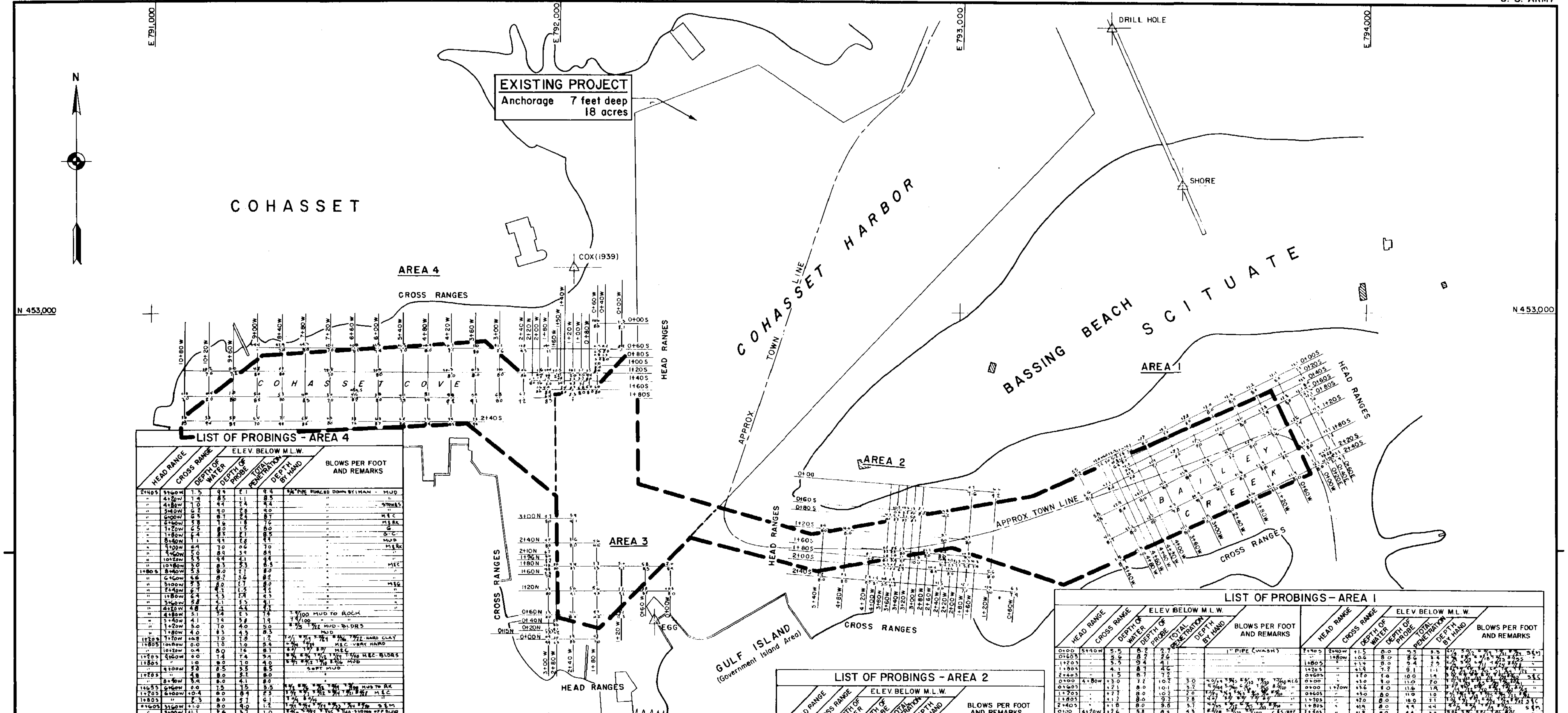
To Accompany Detailed Project Report Dated 19 FEB. 1965

SCALE 1:1200 | SPEC. NO CIV ENG-10-000-

DRAWING NUMBER 90 F-3-1

SHEET 1 OF 2

PLATE NO. II



LIST OF PROBINGS - AREA 4

HEAD RANGE	CROSS RANGE	DEPTH OF WATER (ELEV. BELOW M.L.W.)	DEPTH OF PROBE	TOTAL PENETRATION	DEPTH BY HAND	BLOWS PER FOOT AND REMARKS
2+40S	3+60W	7.3	9.4	2.1	9.4	3/4" PIPE FORCED DOWN BY 1 MAN - MUD
"	4+20W	7.4	8.5	1.1	8.5	"
"	4+80W	7.0	9.4	2.4	9.4	" STONES
"	5+40W	6.2	9.0	2.8	9.0	"
"	6+00W	6.3	8.7	2.4	8.7	M & C
"	6+60W	5.8	7.6	1.8	7.6	M & RK
"	7+20W	6.5	8.0	1.5	8.0	G.
"	7+80W	6.4	8.5	2.1	8.5	G-C.
"	8+40W	7.1	9.9	2.8	9.9	MUD
"	9+00W	6.4	7.0	0.6	7.0	M & RK
"	9+60W	5.0	8.9	3.9	8.9	"
"	10+20W	5.3	9.4	4.1	9.4	"
"	10+80W	3.0	8.3	5.3	8.3	M & C
1+80S	8+40W	5.3	8.0	2.7	8.0	"
"	6+60W	4.6	8.2	3.6	8.2	"
"	3+00W	5.3	8.0	2.7	8.0	M & G
"	2+40W	6.7	9.2	2.5	9.2	"
"	1+80W	6.4	9.3	2.9	9.3	"
"	3+60W	5.8	9.1	3.3	9.1	"
"	4+20W	4.8	9.2	4.4	9.2	"
"	4+80W	5.1	7.4	2.3	7.4	7.4/100 MUD TO ROCK
"	5+40W	4.1	7.9	3.8	7.9	7.9/100 " "
"	1+20W	3.0	7.0	4.0	5.0	5.0/5 7.0/12 MUD-BLDRS
"	1+80W	4.0	8.3	4.3	8.3	MUD
1+20S	7+20W	+0.8	7.0	7.8	1.2	[illegible] HARD CLAY
1+80S	10+80W	0.0	7.0	7.0	5.4	[illegible] M & C VERY HARD
"	10+20W	0.4	8.0	7.6	8.1	6.0/ 7.0/ 8.0/ M & C
1+20S	9+60W	6.0	7.4	7.4	5.4	[illegible] M & C - BLDRS
1+80S	"	1.0	8.0	7.0	4.0	[illegible] MUD
"	9+00W	5.0	8.5	3.5	8.5	SOFT MUD
1+20S	"	4.8	8.0	3.2	8.0	"
"	8+40W	3.9	8.0	4.1	8.0	"
1+65S	6+60W	0.0	7.5	7.5	3.5	[illegible] MUD TO RK
1+20S	6+00W	+0.4	8.0	8.4	2.3	[illegible] M & C
1+80S	"	2.3	8.0	5.7	6.1	[illegible]
0+60S	3+60W	+1.0	8.0	9.0	1.2	[illegible] S & M
"	3+00W	+1.1	2.6	3.7	1.0	[illegible] SLIDING OFF BLDR
"	2+40W	+2.8	4.3	7.1	2.0	[illegible] M & S TO REF
"	1+80W	+4.0	+1.1	5.1	+3.5	[illegible] M & G & RK
"	0+60W	-0.5	6.5	6.0	2.1	[illegible] M & G R
1+20S	4+20W	+0.3	8.0	8.3	2.6	[illegible] S & M
"	3+60W	0.3	8.0	7.7	3.7	[illegible] S & M
"	1+80W	+0.4	4.6	5.0	1.0	[illegible] M-C-RK.
"	2+40W	0.6	8.0	7.4	5.6	[illegible] MUD-STONES
"	3+00W	1.0	8.0	7.0	5.6	[illegible] MUD
"	2+00W	1.6	6.0	6.4	6.6	[illegible] MUD TO ROCK @ 8.0
1+40S	1+80W	1.7	5.0	3.3	3.6	[illegible]
1+20S	1+60W	+0.5	2.6	3.1	0.0	[illegible] MUD TO ROCK
1+40S	1+50W	0.5	8.4	7.9	2.1	[illegible]
1+20S	1+20W	+0.1	2.0	2.1	1.8	[illegible] G. RK
1+40S	"	3.2	4.3	1.1	2.4	[illegible] MUD-ROCK
1+80S	"	8.3				
1+40S	1+00W	3.7	1.1	3.4	2.4	[illegible] MUD-RK
1+20S	"	1.1	3.6	2.5	2.1	[illegible] MUD-RK
"	0+60W	8.0				
"	0+80W	1.5	4.4	2.9	2.2	[illegible] MUD-RK.
1+40S	"	8.0				
1+60S	1+00W	6.8	8.0	1.2	8.0	MUD-STONES
"	0+80W	6.0	8.0	2.0		"
"	0+60W	6.0	8.0	2.0		"
"	1+40W	2.4	8.0	5.6		"
"	1+20W	8.2				
"	1+80W					
0+60S	8+40W	+2.9	7.0	9.9	+0.4	[illegible] HARD CLAY
"	7+80W	+4.3	8.0	12.3	+3.6 M&C	[illegible]
"	7+20W	+2.1	7.0	9.1	+1.0	[illegible] M & CLAY
"	9+00W	+4.4				NO PROBE - DOCK
1+20S	10+20W	+0.1	7.0	7.1	3.1	[illegible] MUD-CLAY
0+00	0+00	1.3	8.1	6.8	6.8	MUD
0+60S	0+00	8.2				
0+00	0+60W	+0.6	8.0	8.6	6.4	[illegible] MUD
0+60S	0+40W	0.2	8.0	7.8	6.8	[illegible] "
0+80S	"	1.3	8.0	6.7	6.3	[illegible] "
"	0+60W	0.8	5.0	4.2	3.0	[illegible] MUD TO ROCK
1+00S	0+60W	5.0	8.0	3.0	8.0	MUD
1+60S	1+80W	4.0	8.0	4.0	5.1	[illegible] MUD-STONES
1+40S	2+00W	1.7	5.6	3.9	2.0	[illegible] MUD-ROCK
1+60S	"	1.6	8.0	6.4	4.2	[illegible] MUD
1+40S	2+20W	1.7	8.1	6.4	4.0	[illegible] "
0+60S	4+20W	+0.7	7.1	7.8	3.5	[illegible] RK
"	4+80W	+0.9	8.0	8.9	1.7	[illegible] M & C
"	5+40W	+1.5	7.0	8.5	0.7	[illegible] MUD-CLAY
"	6+00W	+1.5	7.4	8.9	1.0	[illegible] M-C-STONES
"	6+60W	+0.8	7.1	7.9	0.5	[illegible] CLAY

LIST OF PROBINGS - AREA 3

HEAD RANGE	CROSS RANGE	DEPTH OF WATER (ELEV. BELOW M.L.W.)	DEPTH OF PROBE	TOTAL PENETRATION	DEPTH BY HAND	BLOWS PER FOOT AND REMARKS
0+60W	1+80N	5.8	8.5	2.7	8.5	3/4" PIPE FORCED DOWN BY 1 MAN - MUD
0+00W	1+20N	+0.5	8.0	8.5	8.0	"
"	1+80N	2.0	8.9	6.9	8.9	"
0+60W	1+20N	3.8	8.2	4.4	8.2	"
1+20W	"	7.2	9.1	1.9	9.1	"
1+20W	1+80N	5.0	9.2	4.2	9.2	"
1+80W	"	3.7	9.3	5.6	9.3	"
1+20W	0+60N	9.1	12.5	3.4	12.5	" G
2+40W	1+80N	4.4	8.7	4.3	8.7	"
"	2+40N	3.6	8.0	4.4	8.0	"
"	3+00N	5.9	9.1	3.2	9.1	"
"	1+20N	5.0	9.1	4.1	9.1	"
"	0+60N	7.1	10.3	3.2	10.3	"
"	0+00N	3.5	8.3	4.8	8.3	" TO RK
1+80W	2+40N	4.6	10.5	5.9	10.5	"
"	1+20N	5.6	9.3	3.7	9.3	"
"	0+60N	9.7	10.2	0.5	9.2	"
"	0+00N	4.3	7.0	2.7	7.0	" TO RK
3+00W	3+00N	2.7	8.0	5.3	8.0	"
"	2+40N	4.8	8.0	3.2	8.0	"
"	2+10N	6.2	8.0	1.8	8.0	"
"	1+96N	2.9	2.9	0.0	2.9	" RK
2+80W	1+80N	5.0	8.0	3.0	8.0	" MUD
3+00W	"	+3.8	+3.8	0.0	0.0	ROCK EXPOSED
"	1+60N	3.8	7.4	3.6	7.4	MUD TO ROCK
"	1+20N	1.2	8.0	6.8	8.0	MUD
"	0+60N	1.3	8.0	6.7	5.9	7.9/12 8.0/18
"	0+00	0.9	4.4	3.5	4.4	4.4/100 MUD TO ROCK
"	0+15N	1.2	7.0	5.8	7.0	"
2+80W	0+00	1.0	6.3	5.3	5.8	5.8/4 6.3/100 MUD TO ROCK
"	0+20N	4.1	6.2	2.1	6.2	6.2/100
"	0+40N	5.1	8.0	2.9	8.0	MUD

LIST OF PROBINGS - AREA 2

HEAD RANGE	CROSS RANGE	DEPTH OF WATER (ELEV. BELOW M.L.W.)	DEPTH OF PROBE	TOTAL PENETRATION	DEPTH BY HAND	BLOWS PER FOOT AND REMARKS
2+40S	4+80W	0.8	8.0	7.7	5.8	7.0/65 8.0/110 S&M
"	4+20W	2.9	8.0	5.1	6.9	8.0/65
"	3+60W	0.9	4.2	3.3	2.8	4.0/15 4.1/10 4.2/100 REF
"	3+80W	0.4	5.5	5.1	5.5	4.0/8 5.0/22 5.5/20 5.5/100
"	4+00W	1.9	5.1	3.2	5.1	4.0/8 6.0/25 5.1/4 5.1/100
0+60S	3+60W	+0.5	0.6	1.1	0.6	WASH 10" NO PENET - BLDRS
"	3+40W	+0.3	3.2	3.5		SOFT MUD TO REF 10" WASH. NO PENET.
"	3+00W	3.1	8.0	4.9		2" WASH TO GRADE REF @
"	3+20W	1.3	8.0	6.7		"
0+80S	"	5.0	8.5	3.5		1" WASH - VERY SOFT
"	3+60W	5.3	8.7	3.4		"
"	3+40W	5.3	8.2	2.9		"
"	3+80W	4.3	8.0	3.7		"
0+60S	2+40W	4.8	10.2	5.4		"
1+20S	"	5.1	8.0	2.9		"
"	1+80W	4.9	8.0	3.1		"
1+80S	"	+1.3	5.8	7.1	1.8	[illegible] REF
1+60S	"	+0.8	8.0	8.8	2.8	[illegible] S & C
1+60S	2+60W	+1.2	8.0	9.2	2.5	[illegible]
1+80S	2+00W	+1.5	7.1	8.6	2.7	[illegible]
"	2+40W	+0.9	5.2	6.1	2.3	[illegible] BLDRS-REF
"	2+20W	+1.2	2.3	3.5	2.3	2.3/100 REF
2+40S	2+40W	+1.5	8.0	9.5	3.5	[illegible] M & C
2+40S	1+80W	+2.1	7.1	9.2	2.1	[illegible]
"	1+20W	+2.4	7.0	9.4	2.5	[illegible]
"	0+60W	6.3	7.9	1.6	7.9	FLOAT AREA DREDGED MUD
1+80S	1+20W	5.6	8.0	2.4	8.0	[illegible] MUD & RK
"	1+60W	+0.3	7.4	7.7	3.1	[illegible] M & C.
2+00S	2+60W	+0.4	8.4	8.8	4.6	[illegible]
2+00S	2+20W	+0.6	8.0	8.6	4.0	[illegible]
0+00	1+80W	0.7	7.6	6.9	7.6	SOFT MUD
"	1+20W	6.6	9.2	1.6	9.2	"
1+20S	4+80W	4.0	8.0	4.0	8.0	"
"	5+40W	5.4	8.0	4.6	8.0	"
1+80S	3+00W	1.5	10.0	8.5	5.5	[illegible]
"	3+60W	1.0	5.9	4.9	3.8	[illegible] BLDRS
"	3+40W	1.1	8.0	6.9	6.2	[illegible] BLDRS
1+60S	"	6.3	8.0	1.7	8.0	GRAVEL & BOULDERS
2+00S	"	0.1	6.3	6.2	4.3	[illegible] C & RK
"	3+60W	0.8	8.0	7.2	4.2	[illegible] GRAVEL-STONES
1+60S	3+80W	6.2	8.2	2.0	8.2	MUD
"	3+60W	5.5	8.3	2.8	8.3	"
1+80S	3+80W	6.2	8.1	1.9	8.1	"
2+00S	"	4.3	11	2.8	7.1	7.1/100 ROCK
1+80S	4+20W	8.1	10.0	1.9	10.0	MUD
2+40S	5+40W	2.2	8.0	5.8	4.2	[illegible] MUD-GRAVEL
1+60S	2+40W	0.2	8.0	7.8	8.9	[illegible]

LIST OF PROBINGS - AREA 1

HEAD RANGE	CROSS RANGE	DEPTH OF WATER (ELEV. BELOW M.L.W.)	DEPTH OF PROBE	TOTAL PENETRATION	DEPTH BY HAND	BLOWS PER FOOT AND REMARKS
0+00	5+40W	5.5	8.2	2.7		1" PIPE (WASH)
0+60S	"	5.6	8.2	2.6		"
1+20S	"	5.3	9.4	4.1		"
1+80S	"	4.1	8.7	4.6		"
2+40S	"	1.5	8.7	7.2		"
0+00	4+80W	+3.0	7.2	10.2	3.0	[illegible] M & C
0+60S	"	+2.1	8.0	10.1	3.2	[illegible]
1+20S	"	+2.2	8.0	10.2	2.0	[illegible]
1+80S	"	+1.2	8.0	9.2	2.8	[illegible]
2+40S	"	+1.8	8.0	9.8	5.7	[illegible]
0+00	4+20W	+2.6	5.8	8.4	4.3	[illegible] C & S-REF
0+60S	"	+2.5	8.0	10.3	4.6	[illegible] C & S-REF
0+40S	"	+3.2	7.6	10.8	1.6	[illegible]
0+20S	"	+3.6	8.0	11.6	2.1	[illegible]
0+20S	4+40W	+2.8	6.4	9.2	1.6	[illegible]
0+00S	4+00W	+2.7	7.0	9.7	3.4	[illegible] C-HARD
0+00	4+40W	+3.9	5.2	9.1	+0.1	[illegible]
0+00	4+60W	+4.0	7.0	11.0	1.5	[illegible]
1+20S	4+20W	+2.7	8.0	10.7	1.6	[illegible]
1+80S	"	+2.2	8.0	10.3	2.1	[illegible]
0+00	3+60W	+2.7	8.0	10.7	1.4	[illegible] S & C
0+60S	"	+1.9	7.1	9.0	1.6	[illegible]
1+20S	"	+1.3	8.0	9.3	1.3	[illegible]
1+80S	"	+1.2	7.8	9.0	2.8	[illegible]
2+40S	"	+1.7	8.0	9.7	3.1	[illegible] S & M
2+40S	3+00W	+1.5	8.0	9.5	3.0	[illegible]
1+80S	"	+0.9	8.0	8.9	2.2	[illegible]
1+20S	"	+1.4	8.0	9.4	2.8	[illegible] S & C
0+00	"	+3.2	7.0	10.2	1.8	[illegible]
0+60S	"	+2.1	8.0	10.1	2.0	[illegible]
0+00	2+40W	+2.8	8.0	10.8	1.6	[illegible]
0+60S	"	+2.5	8.0	10.5	3.3	[illegible]
1+20S	"	+1.8	7.3	9.1	1.4	[illegible]
1+80S	"	+1.5	8.0	9.5	1.9	[illegible]

HEAD RANGE	CROSS RANGE	DEPTH OF WATER (ELEV. BELOW M.L.W.)	DEPTH OF PROBE	TOTAL PENETRATION	DEPTH BY HAND	BLOWS PER FOOT AND REMARKS
2+40S	2+40W	+1.5	8.0	9.5	3.5	[illegible] S & M
"	1+80W	+0.6	8.0	8.6	3.4	[illegible]
1+80S	"	+1.4	8.0	9.4	2.5	[illegible]
1+20S	"	+1.9	7.2	9.1	1.1	[illegible]
0+60S	"	+2.0	8.0	10.0	1.4	[illegible] S & C
0+00	"	+3.0	8.0	11.0	2.0	[illegible]
0+00	1+20W	+3.6	8.0	11.6	1.9	[illegible]
0+60S	"	+3.0	8.0	11.0	1.0	[illegible]
1+20S	"	+2.0	8.0	10.0	2.1	[illegible] S & C
1+80S	"	+1.9	8.0	9.9	4.4	[illegible] S & M
2+40S	"	+1.8	8.0	9.8	3.2	[illegible]
2+40S	0+60W	+1.9	8.0	9.9	3.7	[illegible]
1+80S	"	+2.0	8.0	10.0	3.3	[illegible]
1+20S	"	+2.6	7.6	10.2	2.1	[illegible] S & C
1+20S	0+00W	+2.6	7.4	10.0	2.0	[illegible] S & C
1+80S	"	+2.5	8.0	10.5	1.5	[illegible]
2+40S	"	+2.1	8.0	10.1	2.0	[illegible] S & M
2+40S	0+60E	+2.1	4.7	6.8	1.9	[illegible] REF
0+00	0+60W	+3.2	8.0	11.2	1.2	[illegible] S & C
0+60S	"	+2.8	7.4	10.2	1.4	[illegible]
"	0+00W	+2.6	8.0	10.8	1.0	[illegible]
2+20S	0+40E	+2.2	6.8	9.0	1.4	[illegible]
2+40S	"	+1.8	7.1	8.9	1.7	[illegible]
"	0+20E	+2.2	7.2	9.4	1.5	[illegible]
2+20S	"	+2.2	7.2	9.4	1.7	[illegible] S & C
1+80S	0+60E	+2.7	7.2	9.9	1.5	[illegible]
1+20S	"	+2.9	7.0	9.9	1.6	[illegible]
0+60S	"	+3.0	3.6	6.6	2.1	[illegible] CLAY TO RK
0+00S	"	+3.1	7.1	10.2	1.9	[illegible] S & C
0+00	0+00	+3.1	8.0	11.1	0.2	[illegible]
0+40S	0+60E	+3.2	8.0	11.2	0.4	[illegible]
0+60S	0+40E	+3.1	7.5	10.6	1.1	[illegible]
0+80S	0+60E	+3.1	7.0	10.1	1.0	[illegible]

GENERAL NOTES

Survey of August and September 1964 by J Rock

BM 2 (1940) Set in ledge 345' west of White Head Light and on East Side of estate of John Fox. It is 10 feet Southeast of highest point of rock ledge forming point at South side of Inlet, and on a line with Nortwest face of building. Elevation above M.L.W. 19.62'

Field books: R&H 2095, 2096, & 2097

LEGEND

ANCHORAGE AREAS
12.6 ACRES - 6 FT. DEEP
SHOWN THUS: ▬ ▬ ▬

LEGEND

M - Mud
C - Clay
G - Gravel
S - Sand
RK - Rock
BLDRS - Boulders
REF - Refusal
M&C - Mud & Clay
S&M - Sand and Mud
S&C - Sand & Clay
C&RK - Clay and Rock
M-G-RK - Mud, Gravel and Rock
M-C-RK - Mud, Clay and Rock

REVISION	DATE	DESCRIPTION	BY

U.S. ARMY ENGINEER DIVISION, NEW ENGLAND
CORPS OF ENGINEERS
WALTHAM, MASS

DR. BY A.J.H. TR. BY A.J.H. CK. BY

COHASSET HARBOR, MASS.

PROBINGS

A.V. Maurello (signature) — PROJECT ENGINEER
F.W. Fogarty (signature) — CHIEF, R. & H. SECTION
SUBMITTED BY (signature) — CHIEF, PLANN & RPTS. BRANCH
APPROVED (signature) — CHIEF ENGINEERING DIV
DATE OCT. 1964

To Accompany Detailed Project Report Dated 19 FEB. 1965

SCALE 1:1200 SPEC. NO. CIV ENG.-19-016-
DRAWING NUMBER 90 F-3-1
SHEET 2 OF 2